Justification :

$$-\frac{\pi}{2} < \varphi_u - \varphi_i < \frac{\pi}{2}$$

Or $u_c = \frac{1}{c}\int i\,dt$ d'ou $\varphi_{uc} = \varphi_i - \frac{\pi}{2}$

$$\varphi_i = \varphi_{uc} + \frac{\pi}{2} \Rightarrow \varphi_u - \varphi_{uc} - \frac{\pi}{2} < \frac{\pi}{2} \Rightarrow 0 < \varphi_u - \varphi_{uc} < \pi$$

$\varphi_u - \varphi_{uc}$ toujours positif : **u(t)** est en avance de phase par rapport à $u_C(t)$

3°)

a-

$\Delta t \rightarrow 1{,}6$ div
$T \rightarrow 10$ div
$\Delta t = \frac{1{,}6}{10} T = 0{,}16T$

$$|\Delta\varphi| = \omega.\Delta t = \frac{2\pi}{T}.0{,}16T = 0{,}32\pi = \frac{\pi}{3}$$

$$\varphi_{uc} - \varphi_u = \frac{\pi}{3}$$

b- $\varphi_{uc} - \varphi_i - \frac{\pi}{3}$

$$\varphi_u - \varphi_{uc} = \varphi_u - \varphi_i + \frac{\pi}{2} = \frac{\pi}{3} \Rightarrow \varphi_u - \varphi_i = -\frac{\pi}{6}$$

c- $\varphi_u - \varphi_q < 0$:le circuit est capacitif

d- $U_{cm} = \frac{I_m}{C\omega}$

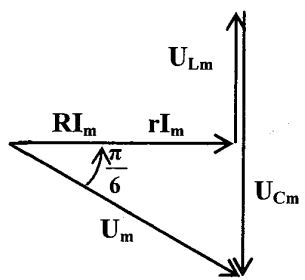
$I_m = U_{cm}.C.\omega = 42{,}5.10^{-6}.2\pi.50.8 = 0{,}1A$

$I_m = 0{,}1$ A

$Z = \frac{U_m}{I_m} = \frac{8}{0{,}1} = 80\Omega$

$Z = 80\Omega$

4°) $L\frac{di}{dt} + (R + r)i + \frac{1}{c}\int i\,dt = u$



$$\cos\left(\frac{\pi}{6}\right) = \frac{R+r}{Z}$$

$$r = Z\cos\frac{\pi}{6} - R = 80\cos\frac{\pi}{6} - 10$$

$r = 60\ \Omega$

$$\operatorname{tg}\left(\frac{\pi}{6}\right) = \frac{\frac{1}{C.\omega} - L\omega}{R+r}$$

$$L = \frac{1}{C\omega^2} - \frac{(R+r)}{\omega}\operatorname{tg}\frac{\pi}{6} = 0{,}13\ H$$